EUROPEAN STATE OF THE CLIMATE

SUMMARY 2020

Copernicus
Europe's eyes on Earth

IMPLEMENTED BY ECMWF

Climate Change Service
climate.copernicus.eu

Cover image: European Union, contains modified Copernicus Sentinel imagery, processed by Annamaria Luongo/SpaceTec Partners 2020.

Image below: The snow-covered Alps, captured by the Copernicus Sentinel-3 mission. Credit: contains modified Copernicus Sentinel data (2020), processed by ESA.

REPORT SECTIONS

This is an interactive document

The top toolbar and contents buttons allow you to navigate through the different sections of the report.

INTRODUCTION

European State of the Climate 2020

Welcome to the summary of the European State of the Climate 2020, compiled by the Copernicus Climate Change Service (C3S), implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF) on behalf of the European Commission.

Explore the complete ESOTC

The complete report is available online at: climate.copernicus.eu/ESOTC/2020

Throughout the report you will find symbols which indicate the types of data and the reference period used for each section. More information on these are in About the report.

C3S provides climate monitoring for the globe, Europe and the Arctic, and annually releases the European State of the Climate (ESOTC). For 2020, the ESOTC includes a short overview of the global context in 2020, a more comprehensive overview of conditions in Europe, and a focus on the Arctic. This report provides a detailed analysis of the past calendar year, with descriptions of climate conditions and events, and explores the associated variations in key climate variables from across all parts of the Earth system. The ESOTC also gives updates on the long-term trends of key climate indicators.

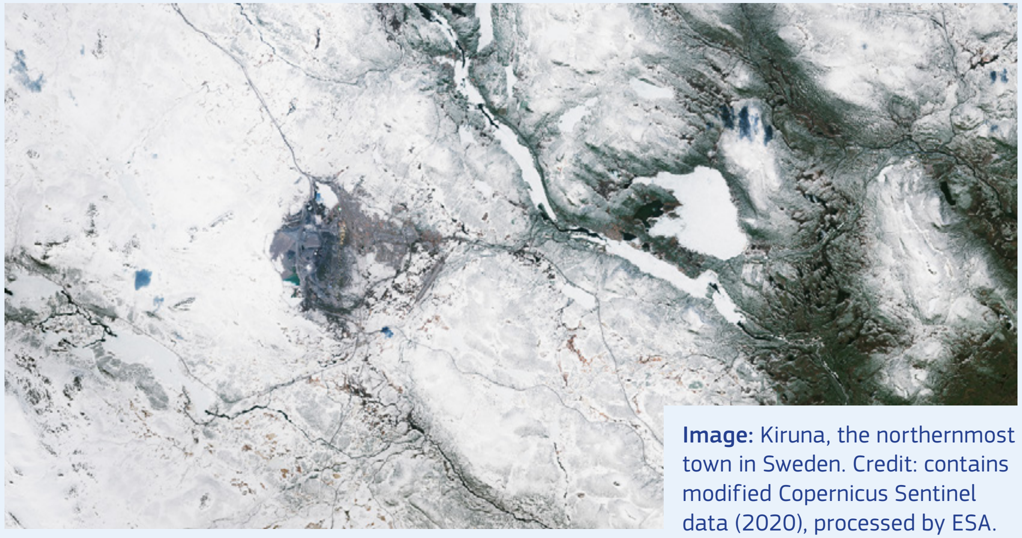


Image: Kiruna, the northernmost town in Sweden. Credit: contains modified Copernicus Sentinel data (2020), processed by ESA.

Atmospheric concentrations of the greenhouse gases CO_2 and CH_4 continued to rise and are at their highest levels on record. Globally, it was one of three warmest years on record. Over northern Siberia, temperatures reached more than 6°C above average for the year as a whole, with dry conditions and record-breaking fire activity during summer. In the adjacent Arctic seas, sea ice was at a record low for most of the summer and autumn.

In 2020, the annual temperature for Europe was the highest on record. Winter was particularly warm, also setting a record, at more than 3.4°C above average. This had an impact on snow cover and sea ice, particularly around the Baltic Sea.

In early spring, there was a remarkable transition from wet to dry conditions in northwestern and northeastern Europe, as captured in precipitation levels, river discharge and vegetation cover. Several episodes of very warm weather occurred during the summer and November. Although many temperature records were broken, the heatwaves were not as intense, widespread or long-lived as others of recent years.

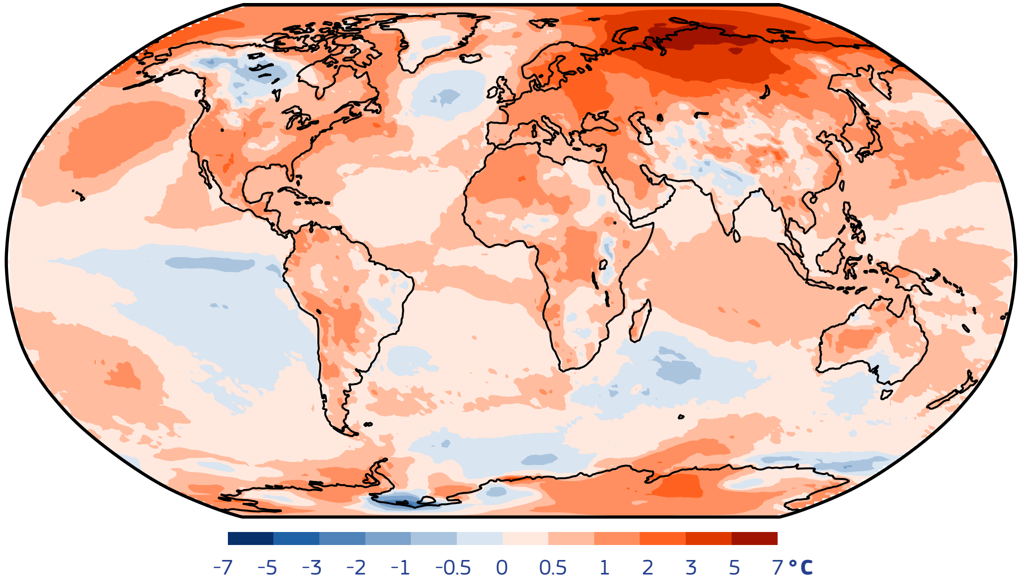
For Europe as a whole, 2020 showed close-to-average fire danger conditions, with periods of locally above-average conditions, most notably in the Balkans and eastern Europe during spring months. Total emissions from wildfires in Europe were lower than average.

Global context in 2020

The evolution of key climate indicators provides the global context for 2020.

The global context is given by the Climate Indicators for which data are available for the majority of the year. These indicators typically build on multi-source or community estimates, leading to a delay for producing final data records, and so not all indicators are covered here.

Additional information about the global climate during 2020 can be found in the World Meteorological Organization (WMO) statement on the State of the Global Climate in 2020.



Surface air temperature for 2020, shown relative to the 1981–2010 average.
Data source: ERA5 Credit: C3S/ECMWF.

Temperature

Globally, 2020 was one of three warmest years on record. Over parts of the Arctic and northern Siberia, temperatures reached more than 6°C above average. Below-average temperatures were recorded over the eastern equatorial Pacific later in the year, associated with cooler La Niña conditions.

Greenhouse gases

Atmospheric concentrations of the greenhouse gases CO_2, CH_4 and N_2O were at their highest since satellite-based observations started in 2003. Preliminary analysis indicates that CO_2 increased at a somewhat lower rate than in recent years, while CH_4 increased more rapidly. These changes are likely due to a slight reduction in emissions linked to the COVID-19 pandemic and to warm temperatures leading to increased CO_2 and CH_4 fluxes associated with land surfaces.

Sea ice

Arctic sea ice reached its second lowest extent on record, while Antarctic sea ice extent was close to average around its annual minimum.

Sea level

Data are only available until June 2020, however, during this period, global mean sea level continued to rise.

Glaciers

Due to the COVID-19 pandemic, several field campaigns were delayed or cancelled, affecting the availability of comprehensive data coverage for 2020 at the time of publication.

Click here to find out more

Europe in 2020

Europe saw its warmest year, winter and autumn on record. Wet and dry conditions varied substantially across the region and the year.

This section provides the 2020 view for Europe compared to the long-term trends of variables across the climate system. Key events that occurred during the year are also described within a climatic context.

Click here to find out more

> “Winter in northeastern Europe was nearly 1.9°C warmer than the previous record, with low sea ice cover for the Baltic Sea and a low number of days with snow in some areas.”

> “The start of the year saw a remarkable transition from wet to dry conditions. In northwestern Europe, it was one of the driest springs on record.”

Image: The Copernicus Sentinel-2 mission takes us over Zeeland – the westernmost province in the Netherlands. Credit: contains modified Copernicus Sentinel data (2020), processed by ESA.

Temperature

The annual temperature for Europe was the highest on record.

In 2020, the annual temperature for Europe was the highest on record; at least 0.4°C warmer than the next five warmest years, which all occurred during the last decade. Winter and autumn were the warmest on record; the winter record was particularly substantial, at more than 3.4°C above the 1981–2010 average and around 1.4°C warmer than the previous warmest winter.

The regions with the largest anomalies during winter and autumn were in the northeastern and eastern parts of Europe, respectively.

During winter, maximum and minimum temperatures over northeastern Europe were up to 6°C and 9°C warmer, respectively, than the 1981–2010 average.

1981–2010

Heat and cold stress

Heat stress levels are increasing across Europe.

During the summer months, the number of days with high heat stress levels are increasing throughout Europe. The number of winter daytimes with cold stress has decreased over time in northern Europe.

For summer 2020, only a few regions of western, central and northern Europe saw a maximum heat stress level that was very different to average. During winter, the region of 'moderate cold stress' reached less far to the south and west than on average, both for nighttime and daytime cold stress levels.

1981–2010

Lake surface temperatures

The surface water temperature of European lakes is increasing.

The surface water temperature of European lakes was just 0.03°C above the 1996–2016 average during their 2020 warm season, from July to September. This is a small positive anomaly, especially when compared with the record of over 0.8°C above average reported in 2018. While temperatures were close to average for the year as a whole, there was wide variability throughout the warm season, with temperatures both above and below average. The warm season European lake surface temperatures are increasing at an average rate of around 0.4°C per decade.

1996–2016

Clouds and sunshine duration

Sunshine duration is increasing across Europe.

2020 saw the largest number of sunshine hours since satellite records began in 1983. This large annual anomaly was driven by significantly above-average sunshine duration from January to May. The largest anomaly values were found in parts of central and eastern Europe.

In line with the high number of sunshine hours, cloud cover was at a record low for 2020. The largest below-average anomalies were found over central Europe and across the land areas bordering the central and eastern Mediterranean Sea.

1991–2020

Warm winter

Record-breaking warmth across a large area of northeastern Europe.

Winter in northeastern Europe was exceptionally warm, with average temperatures nearly 1.9°C higher than the previous record. This led to unusually low sea ice cover in the northern part of the Baltic Sea and the Gulf of Finland, and a low number of days with snow in the area around the southern Baltic Sea. The area of Europe where the daily maximum temperature stayed above freezing in winter was the largest on record, in keeping with a general increase since the early 1980s, and the number of days with 'very strong' and 'strong' cold stress during daytime was the lowest on record.

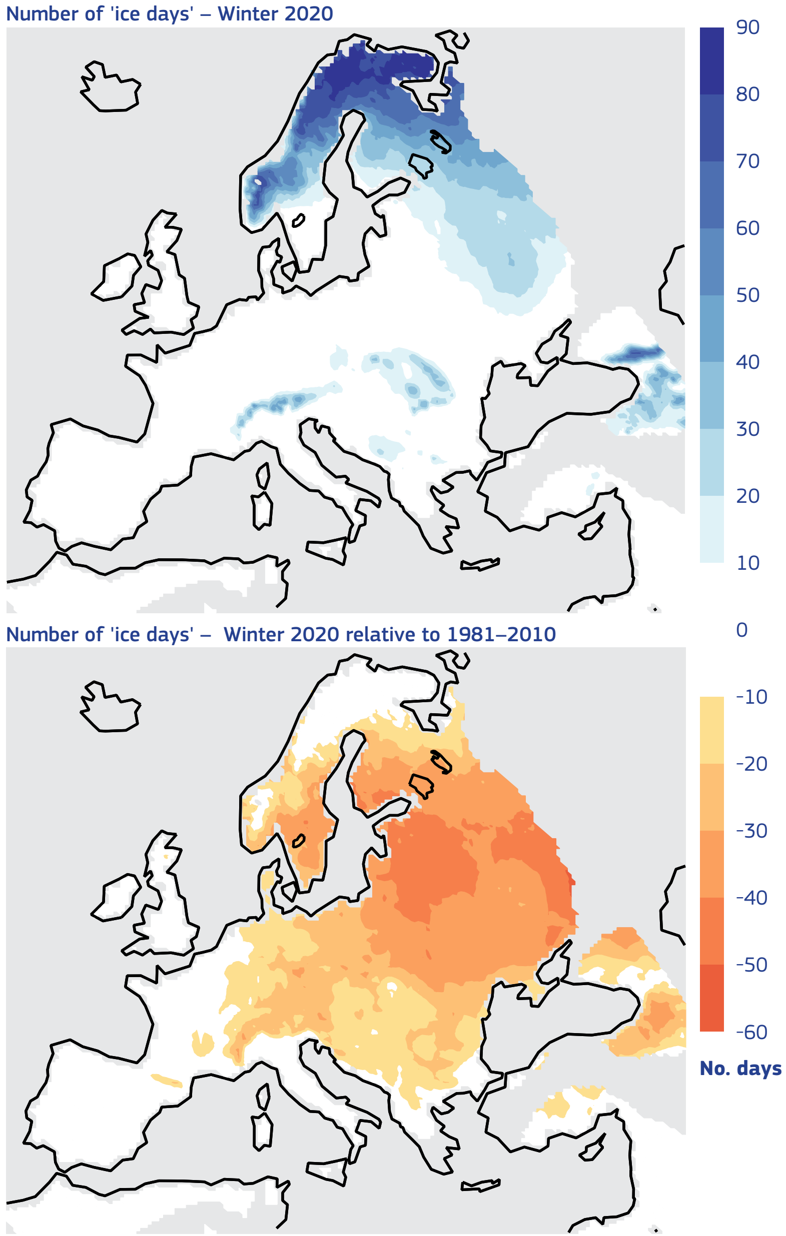
1981–2010

Heatwaves and warm spells

Summer heatwaves were less intense, less widespread, and shorter-lived than in recent years.

Several episodes of very warm weather occurred during the summer, affecting different regions each month. In June, Scandinavia and eastern Europe experienced a high number of 'warm daytimes'. In August, a ridge of high pressure brought warm air up from Africa, driving surface temperatures up and resulting in remarkably warm nighttime temperatures in western Europe. In France, several maximum temperature records for the month of August were broken; high temperatures were observed in other parts of Europe as well. None of the heatwaves were as intense, widespread or long-lived as others of recent years. In early November, Scandinavia experienced a warm spell, breaking daily maximum temperature records.

1981–2010



The number of days during which the daily maximum temperature was below freezing during winter 2020 (top) and for winter 2020 relative to the 1981–2010 reference period (bottom). Data source: E-OBS. Credit: C3S/KNMI.

Precipitation

Precipitation across Europe was near average in 2020.

While precipitation levels were average for the year as a whole, there was a wide range of anomalies between regions and between different times of year. For example, February saw higher levels of precipitation than average, while November saw lower than average precipitation.

A wetter-than-average winter transitioned into a dry spring in northwest Europe, and then across western continental Europe, where persistent dry conditions were present from spring through to autumn. In summer, wet conditions were experienced in a band from the Adriatic Sea to the Baltic countries.

On the whole, there is no significant long-term trend in European precipitation.

1981–2010

Soil moisture

Parts of western Europe saw a long period of drier-than-average conditions.

The year as a whole saw below-average soil moisture conditions of a similar magnitude to 2019, and these were the second lowest since at least 1979. Most of Europe was dominated by soil moisture deficits, especially in France and near the Black and Caspian Seas.

In winter and spring, northeastern Europe experienced above-average soil moisture conditions. Below-average soil moisture conditions occurred during spring in a band from the UK and Ireland to the Caspian Sea. In summer and autumn, western central Europe continued to see below-average soil moisture conditions, whereas eastern central Europe had above-average soil moisture conditions.

1981–2010

River discharge

River discharge in April and May was the lowest since at least 1991.

In parts of northwestern Europe, there was a remarkable transition from exceptionally high river discharge from January to March, to exceptionally low river discharge in April and May. Across Europe, average river discharge in April and May was the lowest in records which date back to 1991.

River discharge in October was above average across large parts of Europe in response to the heavy rainfall from Storm Alex. Correspondingly, over 60% of the river network in northwestern Europe experienced above-average discharge.

1991–2019

Wildfires

Total European wildfire emissions were low compared to the 2003–2019 average.

Wildfires in Europe occur throughout the year, although peak activity is normally during the summer months in the Mediterranean region. For Europe as a whole, 2020 showed close-to-average fire danger conditions, however, there were periods of locally above-average fire danger in winter and spring, most notably in the Balkans and eastern Europe, associated with regional events outside the main fire season. One indicator of wildfire activity is total wildfire emissions. 2020 European emissions were lower than average, possibly due to very few wildfires during the summer, which are typically those with the highest emissions.

Wildfire danger 1981–2010
Wildfire emissions 2003–2019

Transition from a wet winter to a dry spring

There was a remarkable transition from a wet winter into a dry spring.

In February 2020, a large area of Europe was affected by above-average precipitation from several heavy rainfall events. However, northern parts of western Europe experienced one of the driest springs of the last 40 years, in terms of both rainfall and soil moisture.

This wet to dry transition had an appreciable impact on vegetation growth and soil moisture across the continent. On a regional scale, the impacts were seen in river discharge in northwestern and northeastern Europe, notably for the Rhine river basin.

1981–2010
River discharge 1991–2019

Storm Alex

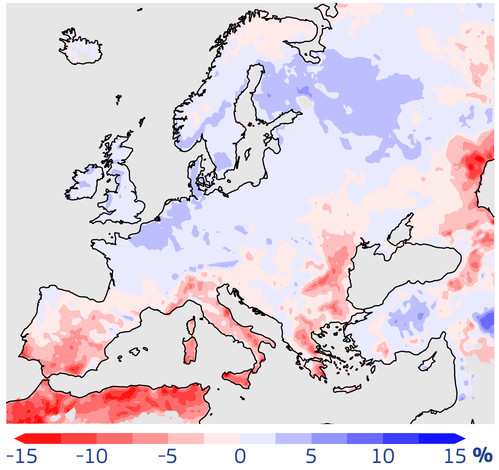
Storm Alex brought exceptional levels of rain in a short period of time.

Storm Alex, in early October 2020, was the first storm of the 2020–21 European winter storm season. The storm brought unusually high levels of rainfall in a short period of time and broke many one-day precipitation records in the UK, northwestern France and in the southern Alps.

The precipitation was particularly high across the French and Italian sides of the Maritime Alps, with daily rainfall in some places more than three times the October average. Storm Alex led to above-average river discharge over large parts of western Europe resulting in devastating floods in some regions.

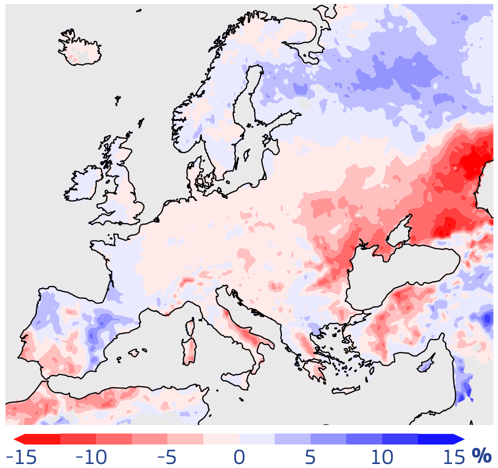
1981–2010

February

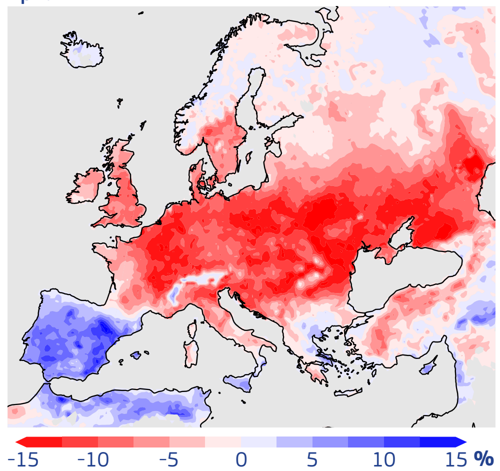


> In early spring, there was a remarkable transition from wet to dry conditions, as captured in precipitation levels, river discharge and vegetation cover.

March



April



Monthly soil moisture anomalies for February, March and April 2020 relative to the respective monthly average for the 1981–2010 reference period. Data source: ERA5. Credit: C3S/ECMWF.

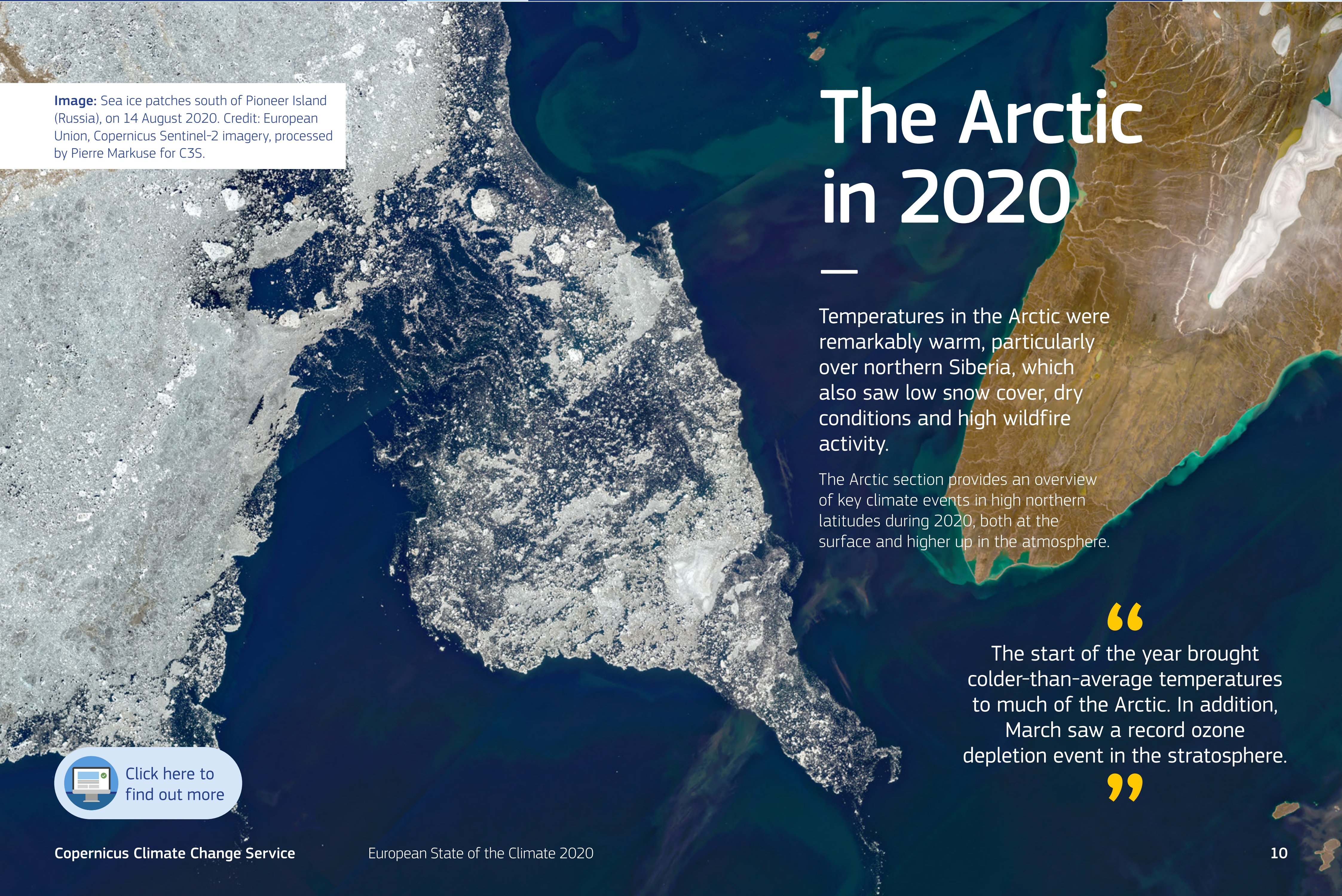


Image: Sea ice patches south of Pioneer Island (Russia), on 14 August 2020. Credit: European Union, Copernicus Sentinel-2 imagery, processed by Pierre Markuse for C3S.

The Arctic in 2020

Temperatures in the Arctic were remarkably warm, particularly over northern Siberia, which also saw low snow cover, dry conditions and high wildfire activity.

The Arctic section provides an overview of key climate events in high northern latitudes during 2020, both at the surface and higher up in the atmosphere.

> “The start of the year brought colder-than-average temperatures to much of the Arctic. In addition, March saw a record ozone depletion event in the stratosphere.”

Click here to find out more

Temperature

For the Arctic as a whole, 2020 was the second warmest year on record.

2020 was the second warmest year on record for the Arctic, with a surface temperature anomaly of 2.2°C above the 1981–2010 average.

The first three months of 2020 were colder than average over large parts of the Arctic. At the same time, most of Europe and Siberia were experiencing much warmer-than-average temperatures. Later in the year, the Arctic saw its warmest summer and autumn on record.

The year was marked by exceptional warmth over large parts of Arctic Siberia, where annual temperature anomalies reached more than 6°C above average, the largest anomalies worldwide.

1981–2010

Heat in Siberia

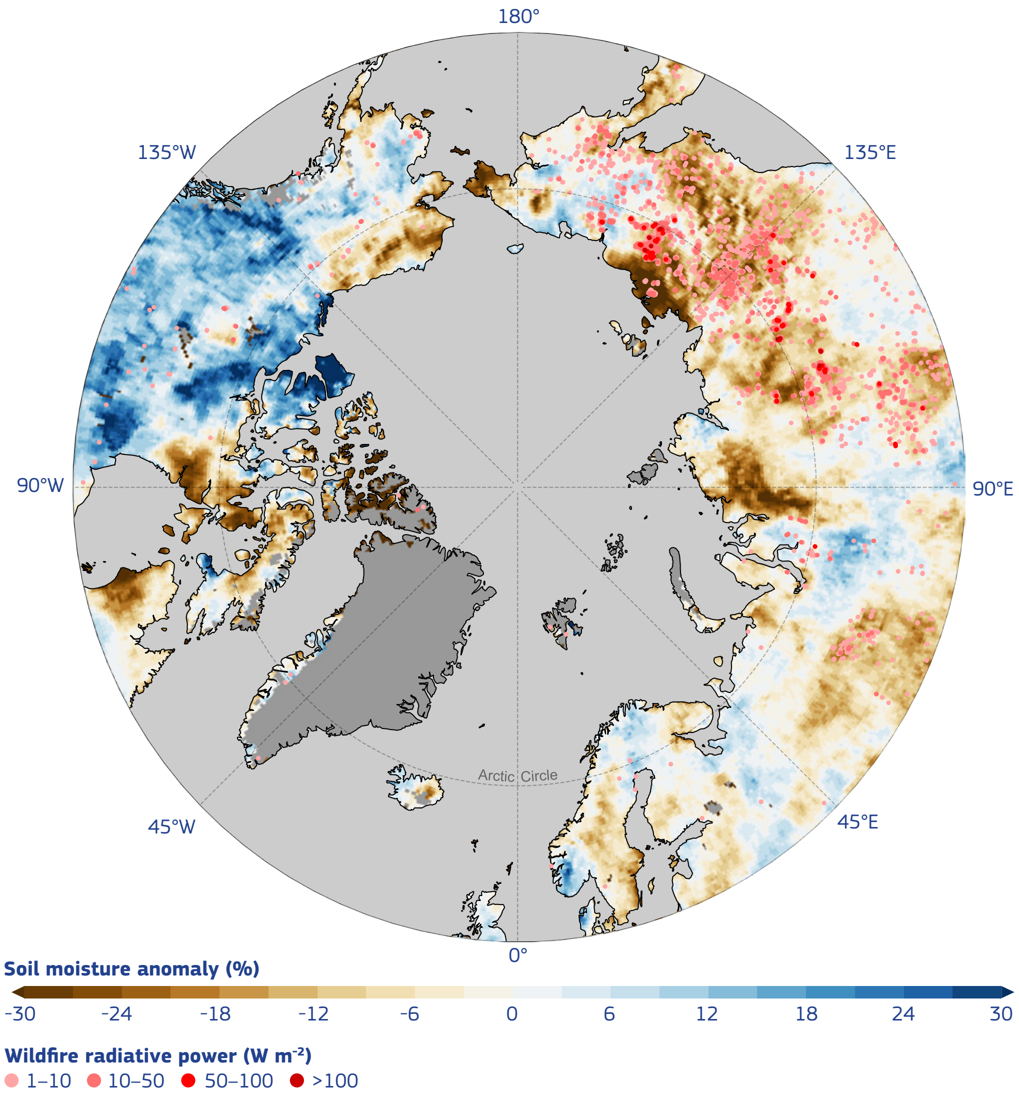
It was by far the warmest year on record in Arctic Siberia.

The average 2020 temperature over the whole of Arctic Siberia was 4.3°C above the 1981–2010 average; 1.8°C above the previous record.

Record temperatures in spring and autumn led to lower-than-average snow cover. This in turn likely contributed to the heat, as less solar energy was reflected and instead was absorbed by the darker snow-free surfaces.

During the summer, Arctic Siberia saw widespread wildfire activity, which resulted in the largest amounts of CO_2 emissions from wildfires since at least 2003.

1981–2010



Summer 2020 soil moisture anomalies relative to the 1981–2010 average (brown/blue) and wildfire locations (red dots). The shades of the dots denote the total wildfire radiative power, a measure of intensity. Data source: ERA5, CAMS GFAS v1.2. Credit: C3S/CAMS/ECMWF.

Image: The Nioghalvfjerdsfjorden Ice Shelf, also known as 79N, is the floating front end of the Northeast Greenland Ice Stream. Credit: contains modified Copernicus data (2020), processed by ESA.

Sea ice

Arctic sea ice extent in September was the second lowest on record.

In September 2020, Arctic sea ice reached its second lowest minimum extent since 1979, behind the record minimum of 2012, with a monthly mean extent 35% below the 1981–2010 average.

Arctic sea ice extent was the lowest on record for the time of year in July and October, primarily due to record low sea ice cover along the coast of Siberia.

The unusually low cover along the Siberian coast resulted in part from rapid sea ice retreat in early summer linked to record high air temperatures over Arctic Siberia.

1981–2010

Cold winter and record ozone depletion

A strong polar vortex led to record stratospheric ozone depletion in March.

The first three months of the year brought colder-than-average temperatures to most of the Arctic. One notable exception was Arctic Siberia which, along with the rest of Siberia and most of Europe, experienced much warmer conditions than normal.

Both the colder Arctic and warmer Eurasia in early 2020 can be linked to an exceptionally strong Arctic Oscillation and its influence on wind and temperature patterns. In the stratosphere, a persistently strong polar vortex led to record ozone depletion in March in the Northern Hemisphere.

1981–2010

Trends in climate indicators

Climate Indicators show the long-term evolution of several key variables which are used to assess the global and regional trends of a changing climate. These also provide the wider context in which to read the report.

Between 1993 and 2020, a mean increase

Globally, of around

3.1 mm ▲

In Europe, of around

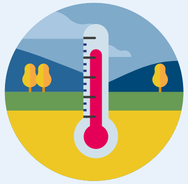
2–4 mm ▲

Per year

Sea level

Between 1993 and 2020, the global mean rise in sea level has been around 3.1 mm ± 0.4 mm per year; a total increase of around 8 cm. Regional trends can deviate considerably from the global mean. For example, across Europe, sea level changes differ between the open ocean and coastal areas due to various geophysical processes.

Sea level data record covering January 1993 to June 2020



Since 1850–1900, an increase

Globally, of around

1.2°C ▲

Europe, of around

2.2°C ▲

Arctic, estimate of around

3°C ▲

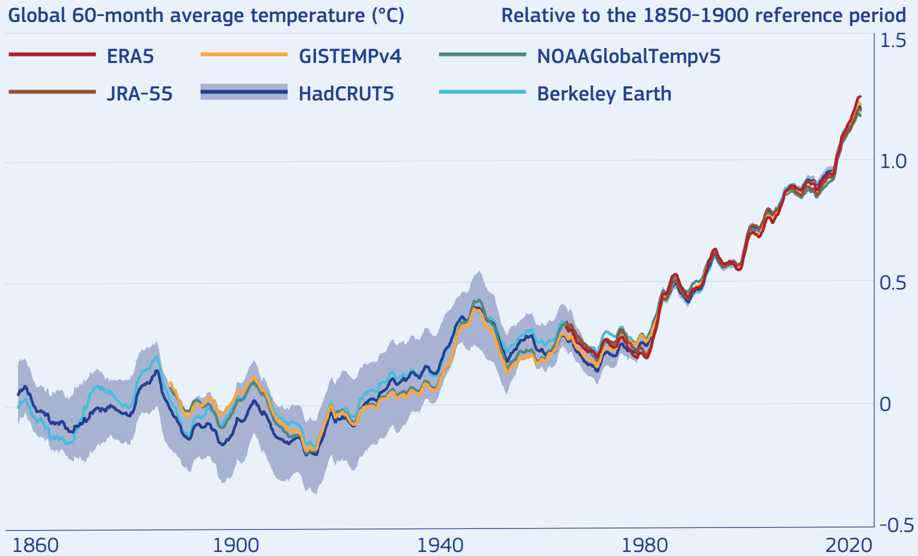
For five-year averages

Click here to find out more

Surface temperature

For surface temperature, the aim of the Paris Agreement, adopted in 2015, is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5°C. The latest five-year average global temperature is the highest on record, and shows a warming of around 1.2°C above 1850–1900 levels. Since the mid-1970s, temperatures over land have, on average, been rising about twice as quickly as those over the sea.

Six temperature datasets covering all or parts of 1850–1900. Values for Europe and the Arctic are over land only.



Estimated difference in global surface air temperature relative to the 1850–1900 reference period, according to six datasets. Credit: C3S/ECMWF.

Greenhouse gases driving climate change

Greenhouse gases (GHGs) in the atmosphere trap heat close to Earth's surface. Although they are essential for a habitable climate, their heat-trapping capacity means that if their levels rise, Earth's temperature also rises, with significant global impacts.

Human activities lead to the emission of GHGs in various ways, including the combustion of fossil fuels for energy, deforestation, the use of fertilisers in agriculture, livestock farming, and the decomposition of organic material in landfills. Of all the long-lived GHGs that are emitted by human activities, the ones that have the largest impact on the Earth's climate are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Greenhouse gas concentrations

The amount of a gas contained in a certain volume of air.

The atmospheric concentrations of CO_2 and CH_4 continue to increase.

Increase since 2010

CO_2 of about

0.6% ▲

CH_4 of about

0.4% ▲

Per year in atmospheric concentrations

Concentrations (column-averaged mixing ratios) for CO_2 and CH_4 covering 2003–2020

Greenhouse gas fluxes

The difference between the amount of a gas added to the atmosphere by emissions from various 'sources' and the amount taken up by various 'sinks', which remove that gas from the atmosphere.

Estimated net surface fluxes of CO_2, CH_4 and N_2O have been increasing during recent decades. Anthropogenic emissions of CO_2 have been partly compensated for by a natural uptake by oceans and vegetation. In some countries, the variation in these fluxes is mainly driven by fossil fuel burning, while for others the dominant process is the natural uptake by vegetation through photosynthesis.

Increase at Earth's surface

CO_2 net fluxes, of about

5000 TgC ▲

CH_4 net fluxes, of about

420 TgC ▲

N_2O net fluxes, of about

18 TgN ▲

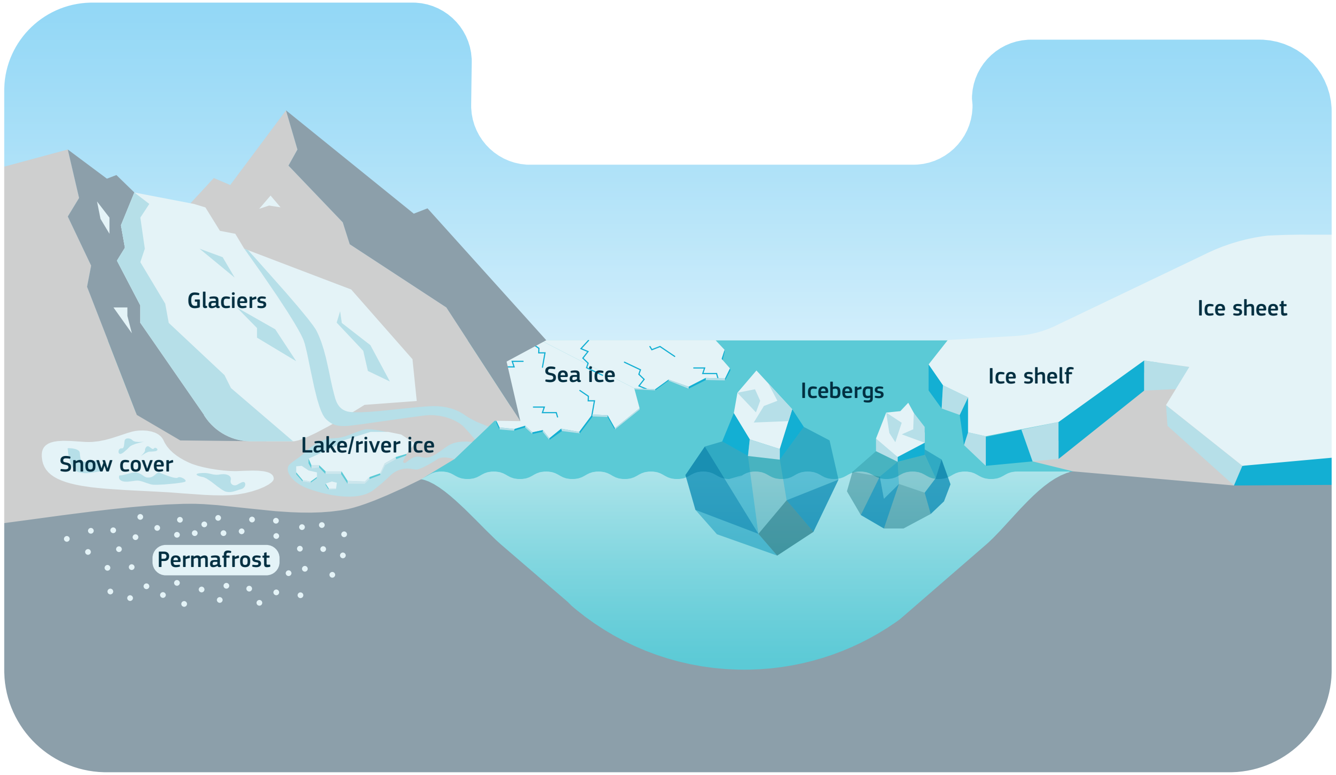
Per year

CO_2: 1979–2019
CH_4: 1990–2019
N_2O: 1996–2018

The cryosphere in a changing climate

The cryosphere encompasses all the parts of the Earth system where water is in solid form, including ice sheets, glaciers, snow cover, permafrost and sea ice.

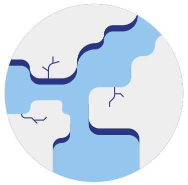
The cryosphere exerts an important influence on Earth's climate. Due to its high reflectivity it impacts the amount of solar energy taken up by the planet's surface, and consequently temperatures. Due to the vast amounts of water stored on land in glaciers and ice sheets, there is a direct impact on global mean sea level. As the climate changes, the cryosphere changes with it, and these changes themselves have an influence back on the climate.



Sea ice

Arctic sea ice extent has declined markedly in all months of the year, as recorded by satellite observations since 1979. The decline has been largest around the annual minimum in September, with widespread retreat across the Arctic. In March, at the annual maximum, long-term retreat is greatest in the Barents Sea. In the Antarctic, sea ice extent shows no clear long-term trend, although more marked changes are seen in parts of the Southern Ocean.

Sea ice data record covering 1979–2020



In the Arctic during 1979–2020

March sea ice extent, per decade	September sea ice extent, per decade
-2.6% ±0.4% ▼	**-12.2% ±1.8%** ▼

In the Antarctic

No clear trend in total sea ice extent

Glaciers

Both globally and in Europe, glaciers are seeing a substantial and prolonged loss of ice mass.

Globally, an average of about 30 m loss of ice thickness has been observed since 1957.

Since 1997, glaciers in Europe have lost between 8 m and 30 m of ice. However, over most of the 20th century, the rate of mass loss was lower, and there have been intermittent periods of mass gain.

Since 1957

Global loss of ice thickness of around

30 m ▼

Since 1960s

European loss of ice thickness

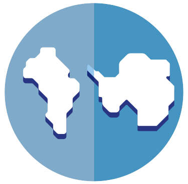
4–35 m ▼

Southwestern Scandinavia and the Alps, respectively

Reference glacier network of more than 30 years of ongoing observations

Ice sheets

Between 1992 and 2018, the Greenland and Antarctic Ice Sheets lost over 6520 Gt of ice, causing global sea levels to rise by more than 18 millimetres. In Greenland, just over half of this ice loss has been through reduced surface mass balance and the remainder from ice discharge. In Antarctica, increased ice losses have been driven by increased glacier discharge.



Between 1992 and 2018

In Greenland

-3800 ±340 Gt ▼

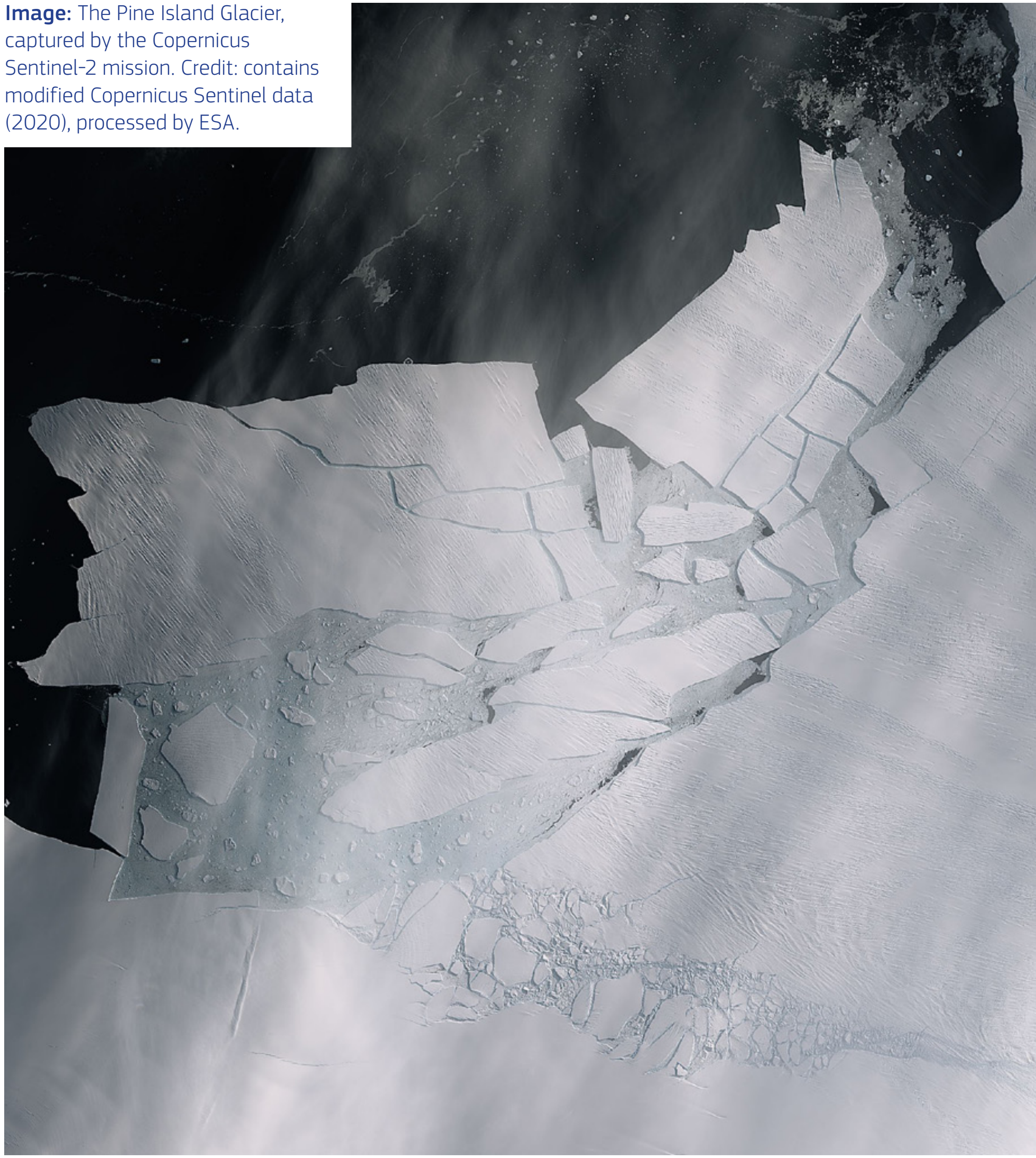
Between 1992 and 2017

In Antarctica

-2720 ±1390 Gt ▼

Satellite data from 11 missions 1992–2018

Image: The Pine Island Glacier, captured by the Copernicus Sentinel-2 mission. Credit: contains modified Copernicus Sentinel data (2020), processed by ESA.



About the report

Contributors

The ESOTC's findings are based on expertise from across the C3S community, as well as other Copernicus services and external partners. The sections are authored by the data providers from institutions across Europe and edited by the C3S team. This report is reviewed by colleagues across the Copernicus network.

The EU Copernicus services: C3S, CAMS, Copernicus EMS, CMEMS, CLMS.

International organisations and initiatives: ECMWF, EC JRC, EEA, ESA, EUMETSAT SAF Network, GCOS and WMO RA VI RCC Network.

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The data behind the ESOTC 2020 and the Climate Indicators

Climate Indicators provide the long-term context for the globe, Europe and the Arctic, and build on datasets and estimates which are brought together to provide a comprehensive multi-source reference, based on data from Copernicus and from other monitoring activities. Where data do not yet fully cover the reporting period, the most up to date information is included.

The ESOTC 2020 sections rely more extensively on the datasets provided operationally and in near real-time by the Copernicus Services, to give an overview of 2020 in the long-term context. The operational data are freely accessible via data catalogues such as the C3S Climate Data Store (CDS). These operational data services build on extensive research and development undertaken by institutions across Europe and the rest of the world.

By comparing 2020 against a reference period, we can see how the year fits within a longer-term context. Generally, the reference period used is 1981–2010, but where less extensive data records are available, more recent and shorter periods are used.

Satellites

Providing information about Earth's surface and its atmosphere from space.

Reanalysis

Using a combination of observations and computer models to recreate historical climate conditions.

In situ

Measurements from an instrument located at the point of interest, such as a land station, at sea or in an aeroplane.

Model-based estimates

Using the laws of physics and statistics to build large-scale models of environmental indicators.

BEYOND THE ESOTC:

Data for assessing climate impacts

Beyond the ESOTC, C3S offers a range of products and tools to explore the impacts of climate change and variability.

The ESOTC provides monitoring of the past year, based on data available from the Copernicus Services and other agencies. C3S extends this offer by providing a sectorally-focused service that delivers data, tools and example workflows to support public and private stakeholders in their climate-sensitive decisions and solutions. This service helps identify the impacts of climate change and variability on vulnerable sectors such as infrastructure, agriculture, food security, water, energy, tourism and health.

C3S investigates how these sectors respond to the interplay of different climate variables by looking at, for example, extreme values, frequency of certain events, or cumulative climate conditions over long periods. The data, tools and example workflows are provided for the past and the present, as well as for the future; the last based on climate projections.

> “Could 2020’s exceptionally warm winter have had an impact on the energy sector?”

Impacts of temperature variations on the net energy demands of buildings

The net energy demands of buildings is dependent on the surrounding air temperatures. Information on the cumulative number of days that are above or below temperature thresholds for specific regions allows users to estimate this demand. This information, as well as related variables, such as energy production, is part of the offer of the C3S energy service.

> “Could the wet to dry transition in 2020 have had an impact on the agriculture industry?”

Potential impacts of unusually wet or dry conditions on agriculture

Throughout a crop’s lifetime, availability of water is vital. Water availability for crops can be estimated from data on evaporation and transpiration. Such information, together with crop productivity data, has been produced by C3S and will soon become part of the global agriculture service.

About us

ECMWF Copernicus services

Vital environmental information for a changing world

The European Centre for Medium-Range Weather Forecasts (ECMWF) has been entrusted by the European Commission to implement two of the six services of the Copernicus programme: the Copernicus Climate Change Service (C3S) and the Copernicus Atmosphere Monitoring Service (CAMS). In addition, ECMWF provides support to the Copernicus Emergency Management Service (Copernicus EMS).

To meet the challenge of global climate change, accurate, reliable and timely data are key. The Copernicus Services at ECMWF routinely monitor data on a global scale, including surface air temperature, precipitation, sea ice area and atmospheric greenhouse gases.

The Copernicus Climate Change Service (C3S)

The Copernicus Climate Change Service adds value to environmental measurements and provides free access to quality-assured, traceable data and applications, all day, every day. C3S offers consistent information on the climate anywhere in the world, and supports policymakers, businesses and citizens to deal with the consequences of climate change and help them prepare for the future.

The Copernicus Atmosphere Monitoring Service (CAMS)

The Copernicus Atmosphere Monitoring Service adds value to air quality and atmospheric composition measurements, and provides free access to quality-assured, traceable data and applications.

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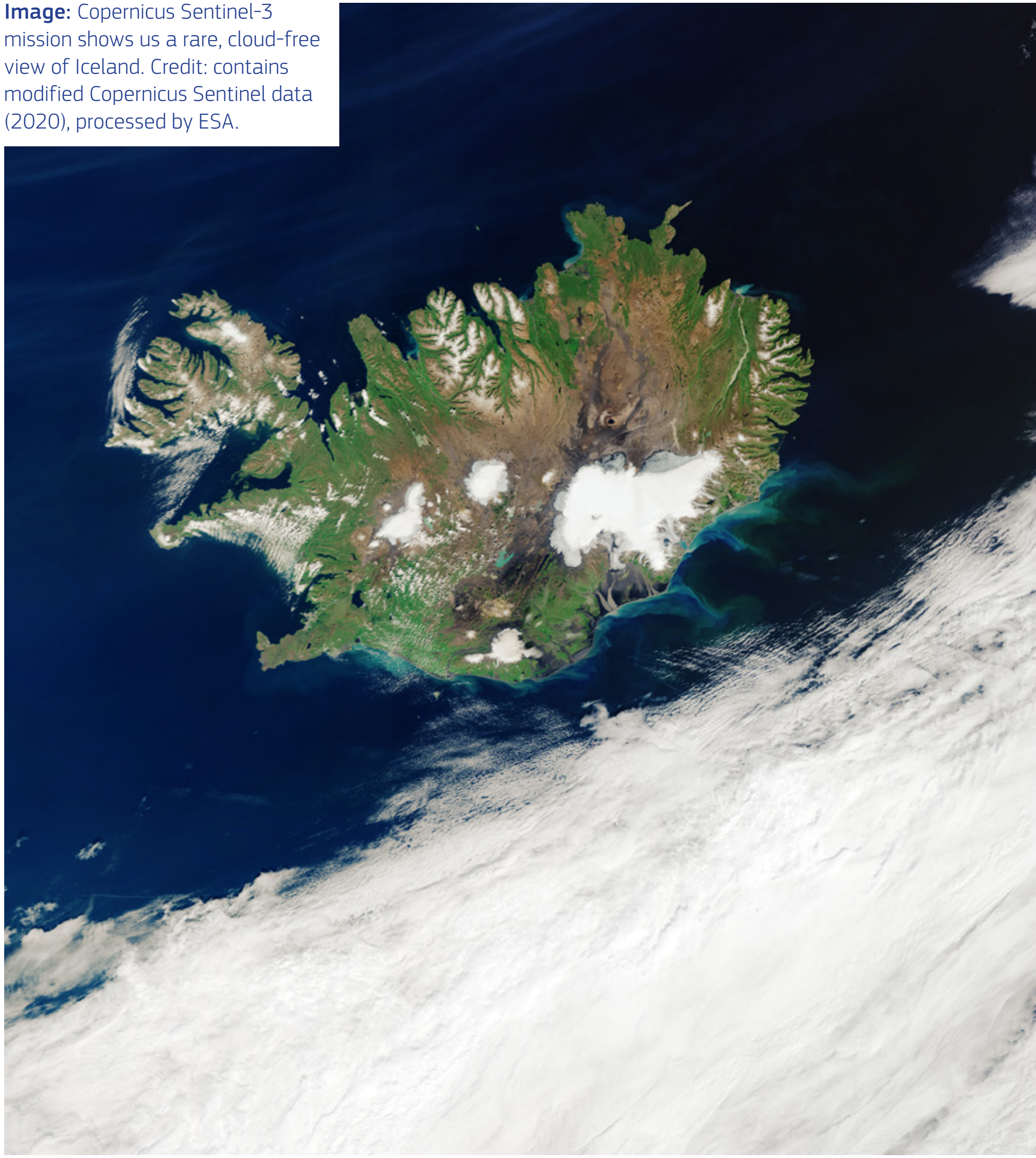
Image: Copernicus Sentinel-3 mission shows us a rare, cloud-free view of Iceland. Credit: contains modified Copernicus Sentinel data (2020), processed by ESA.



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@copernicusecmwf

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Copernicus User Services
copernicus-support@ecmwf.int

Copernicus communication
copernicus-communication@ecmwf.int

Media enquiries
copernicus-press@ecmwf.int

European Centre for Medium-Range Weather Forecasts
Shinfield Park
Reading
RG2 9AX
United Kingdom

Copernicus Europe's eyes on Earth

IMPLEMENTED BY ECMWF

Climate Change Service
climate.copernicus.eu